

Appl. No. 10/628,085  
Amdt. Dated September 25, 2008  
Reply to Office Action of June 25, 2008

### REMARKS

This is a full and timely response to the non-final Office action mailed June 25, 2008. Reexamination and reconsideration in view of the foregoing amendments and following remarks is respectfully solicited.

#### Rejections Under 35 U.S.C. § 103

Claims 1, 5-7, and 9-11 were rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent Publication No. 2003/0139860 to McBrien et al (hereinafter McBrien) in view of Wikipedia Encyclopedia. The Examiner stated that McBrien discloses a fault detection system for detecting faults in a turbine engine, where the fault detection system includes a sensor data processor providing an augmented data set and a logic inference system, the logic inference system analyzing the augmented data set to determine the likelihood that a fault has occurred.

In making these rejections, the Examiner cited elements 14 and 16 of FIG. 3 as disclosing a sensor data processor, and element 30 of FIG. 3 as disclosing a fuzzy logic inference system. Furthermore, the Examiner cited the "filtered or conditioned data" of paragraphs 0050 and 0051 as being "residuals". Finally, the Examiner cited horsepower as being computed from augmented sensor data, and that the use of an "average sum of all horsepower contribution from sensors", citing paragraph 0057.

Applicants respectfully disagree, and submit that the claims are patentably distinct over the cited McBrien reference and Wikipedia entry for horsepower.

First, applicants note that this entry in Wikipedia itself has not been established to be prior art. However, it appears that the Examiner is merely using this entry in Wikipedia as a cite for the definition and history of the term "horsepower".

Next, with regard to the sensor data processor, as noted above, the Examiner again alleged that elements 14 and 16 of McBrien constitute the recited sensor data processor, stating that these elements are configured to augment the sensor data by generating residuals and determining a rate of change of the residuals. Specifically, the Examiner cites the McBrien as teaching a rate of change of the residuals in the form of a

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“horsepower deviation ratio”. Furthermore, in response to Applicants’ previous arguments, the Examiner alleges that “deviation ratio” and “deviation rate” are the same, and cites to a definitions of “rate” and “ratio” to support this.

Applicants again submit that this continues to be a misreading of the reference. First, applicants note that the definition of “rate” and “ratio” provided by the Examiner does not say they are the same thing—instead, the definition of “rate” says that it is “a **special type of ratio**”.

Because “rate” is only a type of “ratio”, it cannot be said that McBrien teaches the specific use of a “rate”, when it only refers to the general term of “ratio”. Furthermore, the cited paragraph 0057 of McBrien clearly describes that the “horsepower deviation ratios” are calculated through division of horsepower terms. **When horsepower is divided by horsepower, the result is a unit-less ratio. A unit-less ratio does not express a rate of change, because it does not have the units of change.** See the equation in paragraph 0057.

Finally, if the Examiner is alleging that horsepower itself is a “rate of change” applicants again note that the claimed limitation is actually of a “rate of change of a residual”. As the Wikipedia reference states, the units of horsepower are “work over time”. “Work over time” cannot be said to be the “rate of change of sensor data residuals” because no “residual” was calculated in determining the horsepower before the “rate of change” was determined.

Applicants can thus find no teaching in McBrien where the **rate of change of residuals from sensor data** is calculated. Applicants thus again submit that this part of the rejection is based on a misinterpretation of McBrien, and that the reference fails to teach the recited limitations.

Second, with regard to the fuzzy logic inference system, the Examiner again alleged that element 30 of McBrien constituted this element. Applicants again disagree, and submit that element 30 of McBrien does not include any sort of fuzzy logic inference system as claimed. While FIG. 3 of McBrien does label element 30 using the phrase “fuzzy logic calculations”, it is merely described as performing calculations relating to

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bypass, stopping or enabling the fault detection system. See FIG. 4 and paragraphs 0046-0048 of McBrien. For example, these sections describe how the element 30 determines if there are sufficient sensors available, and if not the fault detection logic is bypassed. Additionally, element 30 is described as determining the engine operating mode and likewise bypasses the fault detection logic if the engine is not in normal or combat roles. See paragraph 0047 of McBrien.

In contrast, applicants amended independent claims recite that the fuzzy logic inference system includes a plurality of membership functions and is configured to fuzzyfy data using plurality of membership functions. Furthermore, applicants have amended independent claim 1 to recite that the system uses fuzzifies the "residuals from the sensor data and the rate of change of the residuals using the plurality of membership functions". Applicants can find no teaching of any membership functions or the use membership functions on residuals from sensor data, or on the rate of change of residuals. Applicants again note that the Examiner did not cite any particular portion of McBrien as teaching membership functions.

As McBrien fails to teach a sensor data processor or fuzzy logic inference system as claimed, applicants submit that independent claim 1 is patentably distinct over McBrien. Furthermore, as claims 5, 6, 7, 9, 10 and 11 depend from, and include all the limitations of independent claim 1, they are also submitted to be patentably distinct.

Claims 31, 33, 34, 36-38 were rejected under 35 U.S.C. § 103 as allegedly being unpatentable over McBrien in view of Martucci (U.S. Patent No. 6289274) and in further view of the Wikipedia document. Applicants again disagree, and submit that amended independent claim 31 is patentably distinct over the cited references for similar reasons as was expressed with respect to claim 1. Specifically, the Martucci reference was simply cited as teaching a processor, and the reference thus does not overcome the deficiencies in McBrien noted above. Furthermore, as claims 33, 34 and 36-38 depend from, and include all the limitations of claim 31, they are also submitted to be patentably distinct.

Claims 39-45 were rejected under 35 U.S.C. § 103 as allegedly being unpatentable over McBrien in view of Brown et al (U.S. Patent No.5377112). With regard to

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McBrien, this rejection is based on the same rational as that given with respect to claim 1. With regard to Brown, the Examiner relies on Brown to teach sensor data that includes exhaust gas temperature data, engine speed data, and fuel flow data, and the generating of residuals of these data types. Because this rejection relies on the same rational with respect to McBrien that was used to reject claim 1, applicants submit that it fails for the same reasons.

Furthermore, applicants submit that McBrien further fails to teach the specific limitations of claim 39. For example, McBrien does not teach a fuzzy logic system that is "configured to fuzzify the exhaust gas temperature residuals, the engine speed residuals, the fuel flow residuals, the rate of change of the exhaust gas temperature residuals, the rate of change of the engine speed residuals, and the rate of change of the fuel flow residuals using the plurality of membership functions" (emphasis added). Again, applicants note that the Examiner did not cite any particular portion of McBrien as teaching membership functions in general, or the use of membership functions with regard to the specific residual types and residual rate of changes.

As McBrien fails to teach a sensor data processor or fuzzy logic inference system as claimed, applicants submit that independent claim 39 is patentably distinct over McBrien and Brown. Furthermore, as claims 40-45 depend from, and include all the limitations of independent claim 39, they are also submitted to be patentably distinct.

Furthermore, with regard to claims 40 and 41, no part of either reference is seen as teaching low membership functions, high membership functions, medium membership functions, or any membership functions that comprise a first sigmoid function, a trapezoid function, or a second trapezoid function.

With regard to claim 43, no part of either reference is seen as teaching the calculation of a centroid under the aggregated output function.

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Conclusion

Based on the above, independent Claims 1, 31 and 39 are patentable over the citations of record. The dependent claims are also submitted to be patentable for the reasons given above with respect to the independent claims and because each recite features which are patentable in its own right. Individual consideration of the dependent claims is respectfully solicited.

The other art of record is also not understood to disclose or suggest the inventive concept of the present invention as defined by the claims.

Hence, Applicant submits that the present application is in condition for allowance. Favorable reconsideration and withdrawal of the objections and rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

If for some reason Applicant has not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: 25 Sept 2008

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